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December 5, 2016

Department of the Army
US Army Corps of Engineers, Kansas City District
CENWK-EC-EC
601 E. 12th Street
Kansas City, MO 64106

Attn	CENWK-PM-EP/Amy Darpinian
Project:	Contract No. W912DQ-08-D-0018
Subject:	Comments on the Draft Remedial Investigation Report Rolling Knolls Landfill Superfund Site

Dear Amy:

Enclosed please find the CDM Smith's Comments on the PRP's Draft Remedial Investigation Report dated November 2016, prepared by Geosyntec Consultants, Inc., for the Rolling Knolls Landfill Superfund Site for your review and comments.

If you have any questions or comments on this submittal, please call me at (732) 590-4663.

Sincerely,

CDM FEDERAL PROGRAMS CORPORATION

Paul Hagerman, P.E.
Project Manager
CDM Smith

cc: B. Donovan, USEPA
6424-019 File

CDM Smith Technical Review on
Draft Remedial Investigation Report
Rolling Knolls Landfill Superfund Site
Prepared by Integral Consulting, Inc.

CDM Smith has reviewed the Draft Remedial Investigation (RI) Report dated November 2016, for the Rolling Knolls Landfill Superfund Site, prepared by Geosyntec Consultants, Inc. CDM Smith's general and specific comments are listed below.

General Comments

1. There appears to be several table, figure and appendix references that are possible remnants from a previous version. There are also reference to the SCSR that appear as though they should be addressing the RIR. Please review the document and make sure that all references are appropriate and correct for this report.

2. The report organization is hard to follow in some respects. For example, Appendix I seems to include only Phase 1 investigation results. It is recommended to include both phases.

3. It is recommended that a section be added to discuss the screening criteria selected to evaluate environmental data for the RIR. The discussion should include explanations of the criteria for various environmental media (e.g. soil remediation standards - inhalation/direct contact vs. impact to groundwater, groundwater quality standards based the appropriate aquifer classification for the site, soil vapor screening levels for vapor intrusion criteria).

4. Executive Summary: There does not appear to be a summary of the fate and transport of constituents of concern, the conceptual site model in the executive summary. It is recommended that the executive summary include a discussion of each of the bullets noted in Section 1.3 Contents of the RIR.

5. It would be good to have a table added that indicates which surface water and sediment samples were upstream brook samples, downstream brook samples, pond samples. What samples, if any, are in neither category – such as samples collected in the wetlands. The brooks should be better labeled on the maps, especially Black Brook.

6. It is very difficult to follow exceedances using report figures in Section 4 (box maps of all exceedances). Additional figures similar to those in Appendix C (representation of what is below RDC, above RDC and above NRDC in surface soil and sediment; one contaminant per map) would be helpful in evaluating the site contamination.

7. General Comments on Figures – Please review each figure for the clarity of presentation. Some examples of issues with figures are:

a. Ball field and shooting range should be labeled on figures, especially data figures.
b. Figure 2-4 – there appears to be an unlabeled soil sample at MW-18.
c. On Figure 3-3 it appears that basal colluvium and stream terrace deposits are given the same color.
d. Attachment A Aerial photos – inset figures are missing (6, 8, 10, 12, 14). Figures 1 and 2 also missing.
e. Label landscape areas on figures, outline which samples are referenced for each area.
f. Typically contaminant data are provided in cross section, for vertical delineation. This could be provided for specific areas were deeper soil samples were collected.

8. Use of term ubiquitous when describing presence of metals in soil is too general. Does this mean that a group of metals were found in all samples or that some metal was detected in every sample? The description of which metals were detected should be more specific.

9. No deeper groundwater samples were collected for vertical delineation of groundwater, there appears to be a reliance on the thick clay layer preventing downward migration. If this is the case, this should be explicitly stated in the report.

10. Exhibit C and B-3A use for cis and trans chlordane; summary table in Attachment I uses alpha and gamma chlordane; please use terminology consistent with report and tables.

11. Appendix B general comments:

    a. On Appendix B-4C change 1,4-dioxane interim groundwater criterion to 0.4 ppb.
    b. 1,1,2-Trichloro-1,2,2-trifluoroethane interim specific groundwater criterion is 20,000 ppb.
    c. No VI screening levels included or tap water RSLs are provided, though headings are included on the table.
    d. Appendix B-6E has no standards or criteria whatsoever, only background threshold values.

12. Section 6 - The fate and transport work might be better presented prior to the site conceptual model, and probably merits its own section earlier in the report.

13. Section 7 - The surface soil delineation is difficult to follow. There are several contaminants that exceed ARARs at the perimeter of sample locations especially PCBs and benzo(a)pyrene. There is discussion about these being background conditions; it might be good to set a background range for these and show a figure that just shows what exceeds background. There is an instance of vanadium exceeding ARAR at the perimeter. The same is true for sediments (especially metals, PCB, pesticides and some SVOC), to a lesser extent surface water and groundwater (mainly metals for groundwater). In general the report seems heavier on characterization with delineation not as well presented or more difficult to understand due

to the volume of data and the reliance on local background while background levels are not directly accounted for in the box maps.

Specific Comments

1. **Executive Summary Page xvi, last sentence in first paragraph**: Please explain why there is only a hydraulic connection between the large pond and groundwater.

2. **Executive Summary, Page xvii, first paragraph below bullets:** This states that the selected ARARs may change during remedy selection process. This should be discussed further.

3. **Executive Summary, Page xxi, second paragraph** This states all the elements of the RI and risk assessments are complete, but previously it was stated that some contamination is still being investigated (delineated). That is inconsistent; the statement that RI is complete should be deleted or revised. It should also be stated (where appropriate) that ongoing evaluation will be presented in the final RI report.

4. **Section 1.2.1, page 2, first paragraph** – This should mention several smaller ponds are present on the landfill, in addition to the larger ones cited.

5. **Section 1.2.1, page 2, third paragraph** - Besides the two landscaping firms that lease property, there are empty dumpsters on the property, which appear to be owned by another business entity.

6. **Section 1.2.2, page 2 -** Site Ownership includes current ownership; it is typical to include the past ownership history.

7. **Section 1.2.4 Previous Investigations, page 3 -** Please be specific with respect to the parameter lists discussed in this section (i.e. Priority Pollutant, Target Compound List, RCRA). Although there is overlap, list each as each includes a different set of parameters.

8. **Section 1.2.4, page 3, first paragraph** – Why does the RI exclude FIT data? In general there are other data collection events discussed in this section that are not included in the RI.

9. **Section 2.2, page 7, last paragraph** - Ten of the POIs had drums or drum remnants, not just three. Add a statement why test pits/sampling were not conducted at all drum areas.

10. **Section 2.2.2, page 12, third paragraph** – Explain why a 1-ft deep test pit was enough to delineate edge of landfilled materials.

11. **Section 2.2.2, pages 12-13, POI-1 Drum Investigation** - State why no soil samples were collected during POI-1 investigation.

12. **Section 2.2.2, page 14, third paragraph; POI-17 and POI-18 drum investigation** – Where are results of post-ex sample from POI-17/18?

13. **Section 2.2.4, page 16, first paragraph below bullets** - Explain why sampling frequency was less in the regulated areas. Explain why no subsurface samples were collected in the regulated area.

14. **Section 2.2.4, page 16, second paragraph below bullets** – Please review and clarify why no discussion of surface samples at POI-14, which had car battery casings? According to Figure 2-4 there was a sample collected here.

15. **Section 2.2.4, page 16, third paragraph below bullets** – This is the first mention of Weston. The results of samples collected by Weston do not appear to be included in RI. Was Weston the Site Assessment Team mentioned earlier? What was special about TP-09 that the soil samples were collected there? There was potential industrial waste observed there, but that was also true at TP-20-1 and TP-34.

16. **Section 2.2.5, page 18, last paragraph** – Add greater detail about how wells were developed.

17. **Section 2.2.5, page 19, third paragraph** – The sentence about purge rates is confusing, please revise and clarify this discussion.

18. **Section 2.3.1 Soil Sampling, Page 25 -** The first paragraph indicates that soil sampling was performed to delineate constituents present at concentrations above the SRS. Please add a discussion that the SRS are based on direct contact/inhalation pathways. Were impact to groundwater SRS generated and considered in developing the screening criteria for evaluating environmental contamination in the RIR?

19. **Section 2.3, page 25** – The fourth bullet at top of page refers to HC-1 as a monitoring well. HC-1 is not a monitoring well. This is the Hunt Club well that was hooked up to a spigot and was previously used for water supply.

20. **Section 2.3.1, page 26, paragraph 4** – Note that the soil samples collected in association with the temp wells were collected 11 months after the temp wells were installed and sampled. The text should be revised to state this.

21. **Section 2.3.1 page 26, paragraphs 1 and 4** – These cite soil samples SS-125 through SS-158, SS-165 through SS-183 and SS-187 through SS-191. Several were considered sediment, it would be helpful to note that here, since they are missing from the soil tables.

22. **Section 2.3.2, page 27, second paragraph** – Some samples in the range SD-45 through SD-69 were considered soil; please cite as these samples are not on the sediment tables.

23. **Section 2.3.2, page 27, third paragraph** – This paragraph states that "composite" sample was collected; homogenized would be a more accurate term. Please revise the text accordingly.

24. **Section 2.3.5, page 29, first paragraph** - Note that pore water samples were collected in place of MW-13 which could not be installed. Also, the porewater samples were inside the site boundary; proposed well was to be outside the site boundary. Please clarify this in the text.

25. **Section 2.3.6, page 30, paragraph 4** - Specify parameters for filtered samples

26. **Section 2.3.7, page 31** – PW-1 was inside landfill boundary. Sampling procedure was to purge with peristaltic pump and sample with bailer. Please revise the text to include this information.

27. **Section 3.1, page 32** - This references Section 2.4.2; there is no such section, it appears as though it should be 2.2.4, please confirm and revise the text.

28. **Section 3.1, page 32, Paragraph 3** - Several perimeter test pits had trash, several only went 1 ft. TP-10 was perimeter and clean, but only went 1 ft. Some edge areas lack a test pit. This may not be sufficient to delineate edges for the purposes of the feasibility study or later design efforts. Please revise the text to provide this consideration.

29. **Section 3.1, page 32, Nature and Extent of Landfilled Materials, Second paragraph, Second Sentence** - The text states that total excavation depths ranged from 1 to 18 feet. Does this refer to the depth of the excavations during the test pit investigation or depth of fill material encountered in the test pits. Please clarify in the text.

30. **Section 3.1, page 33** – The west facing transect discussion for TP-10 is unclear. Please review and clarify the text.

31. **Section 3.1, page 33** - Reference to Section 2.2.1.3 is incorrect. Seems to refer to 2.2.2, but this section does not include discussions of TP-10, as suggested here.

32. **Section 3.1, page 34** – References to 2.4.2 – should be 2.2.4.

33. **Section 3.3 Geology, Page 37, Fourth paragraph** - Recommend that the discussion of the glacial sediments above the glacial lake clay unit be discussed in more detail as this is the key water-bearing unit that affects the migration of groundwater impacted by the Site. In particular, the characteristics of the sand units (e.g. thickness, aerial extent, continuity of beds) are important to a discussion of the transport of contaminants and development of the conceptual site model.

34. **Section 3.4.2.1 Hydrostratigraphic Units, Page 39, First full paragraph -** As with the discussion of local geology, the discussion of local hydrostratigraphic units should discuss details of the water-bearing units (silt, sand and clay). What is the saturated thickness, how do they relate to hydraulic conductivity estimates in support of future flux calculations. It is also recommended that the cross sections be extended to include the streams that are concluded to be local discharge points, and that consistent scales be used for all of the cross sections so that they are more easily compared.

35. **Section 3.4.2.2 Groundwater Occurrence and Surface-Water Interaction, Page 40, First full paragraph** - The next to last sentence states that "Depths to water below groundwater surface in the wells..". Should this say "Depths to water below ground surface in the wells"?

36. **Section 3.4.2.3 Hydraulic Properties, Page 42, First paragraph** - Please present the equation (if hydraulic conductivity was calculated) or the graphs used (if graphical method was used) along with a discussion of how the method was used: the assumptions (e.g. saturated/aquifer thickness), conversion factors (e.g. gpd/ft to ft2/day) and limitations of the method used. Table 1 from Attachment G appears to be an important summary of many of these factors. Perhaps it would help to make the table part of the RIR tables included in the body of the report as it would help the reader understand which wells were used and what the range in conductivity is for each well.

37. **Section 3.4.2.3 Hydraulic Properties, Page 42, Second paragraph, first sentence** - The "Darcy groundwater velocity" is not the same as average linear velocity. It is actually a flux that does not include porosity in its calculation. Recommend changing the term used in this sentence.

38. **Section 3.4.2.4 Hunt Club Well HC-1, Page 43, First complete paragraph** - Based on the range in clay thickness from literature and the observed well depth, would Geosyntec conclude that the well is completed in fractured rock? Water supply wells completed in rock typically have open hole construction, which is consistent with the video survey.

39. **Section 3.4.2.4, page 43, second paragraph** – HC-1 appears to be a bedrock open hole well based upon the video inspection. Please confirm and revise the text accordingly.

40. **Section 4.1.1, page 57, first paragraph**– Dozens of old telephone hand sets are present in one area of the landfill, possible industrial waste (west of MW-7 or MW-6).

41. **Section 4.2.1, pages 59-61** - The discussion of whether wastes at test pit locations TP-09, TP-20-1 and TP-34 is inconsistent. Samples were collected due to possible industrial waste. For TP-9 the discussion focuses heavily on mephenesin, detected as a TIC, and that it was used in a wide variety of commercial products so that its presence is not indicative of industrial waste. At the end of this section (and on page 57, 41.1.), TP-09 is considered possible industrial waste, due to high levels of PCB, BTEX, TCE and DCE, and visual observations. Please review to make the sections more consistent and specify which field observations suggest industrial waste (i.e. sheen for example).

42. **Section 4.1.2, page 58, second paragraph** – what is the evidence/documentation of skeet shooting over the ponds as opposed to the shooting range?

43. **Section 4.2.1, page 60, second paragraph** – Discuss how the TIC mephenesin was delineated. In general, report leaves discussions of TICs unresolved. Their presence is stated with no follow up conclusion.

44. **Section 4.2.2, page 62** - Discuss why no soil samples were collected near POI-1. Post excavation soil samples were collected at POI-17 and POI-18; where are the results provided?

45. **Section 4.3, page 63, second paragraph** - State why was it necessary to reanalyze metals in soil.

46. **Section 4.3, page 63, third paragraph** - Where text reads "A comparison to Residential and Non-Residential SRSs is presented in Appendices A-3A and A-3B.", that should be Appendices B-3A and B-3B. Please review and revise the text.

47. **Section 4.3.1.1, page 64 second paragraph** – PCB congeners, dioxin, furans were not included in Appendix J for reference areas. Please review and revise the text accordingly.

48. **Section 4.3.2.2 Shooting Range, Page 66** - This section discusses the results of soil sampling at an onsite shooting range north of the landfill. Samples from this area were not elevated in lead. Later it is speculated that an offsite shooting range could have contributed lead to offsite soils west of the landfill. The report should be clear as to which shooting range is being discussed and why it is concluded that one may have contributed lead to soil when another does not appear to have.

49. **Section 4.3.2.3, page 67, second paragraph** – The statement is made that certain VOCs were detected in low concentrations at isolated samples and were limited to BTEX compounds. Ethylbenzene and xylene were the only BTEX compounds; EB was found in 3 of 10 samples, xylene in 4 of 10 samples. Those do not seem "isolated". It is acknowledged there were no exceedances.

50. **Section 4.3.2.3, page 67, last paragraph**– Include 4,4-DDE and heptachlor epoxide among list of most commonly detected pesticides; only gamma chlordane and alpha chlordane was detected in all 10 samples – text suggests otherwise. Please review and revise accordingly.

51. **Section 4.3.2.3, page 68, paragraph 2** - TEQ for dioxin does not match that listed in Attachment J.

52. **Section 4.3.2.5 Landfill, page 69** - This section discusses the presence and frequency of contaminants detected in surface soil samples at the Landfill, but does not discuss distribution. Were the contaminants randomly distributed or concentrated in certain areas of the Landfill? Please discuss the distribution in all sections presenting the results of soil sampling and analysis. References to figure(s) are not sufficient to express the conclusions of the investigators.

53. **Section 4.3.2.5, page 69, first paragraph** – References Attachment I (presumably Table 25) – Attachment I only includes Stage 1 and Stage 2 samples (through 2010). Attachment J references a total of 123 sample locations for landfill, Landscape Area 1 and Landscape Area 2/Hunt Club. This page of the RI references 122 locations. Largest N on Attachment 1 (table 25) is 121. Tables 23 and 24 summarize samples from the Landscape Areas/Hunt Club separately – are they excluded from Table 25? Number of locations, and what is included in each table/discussion is confusing. Please review and revise for clarity.

54. **Section 4.3.3, page 73** – Please consider whether a statement can be made on likelihood of point source for inorganics and PCBs, similar to what was said about other contaminants, and revise the text accordingly.

55. **Section 4.4, page 75, Second paragraph** - Appendix reference should be B-3A and B-3B, which covers TCL/TAL and congeners.

56. **Section 4.5, page 76, summary table of exceedances** – There are other exceedances; it is recommended to add a comprehensive table.

57. **Section 4.5.2, page 78, first paragraph** – States that sample depths ranged from 9 to 19 feet bgs; a sample was collected 24.5-25' deep at SS-177. Please review and revise accordingly.

58. **Section 4.5.3, page 78** – Appendix table B-3B does not show the non-cancer USEPA RSL and does not distinguish which samples exceeded the non-cancer risk from which only exceed the cancer risk RSL.

59. **Section 4.5.3,, page 79, last line of section** - SS-183 value is 6.766, more than marginally above the cancer RSL of 4.8 ng/kg. Please revise text to remove the statement "only marginally".

60. **Section 4.6 Groundwater, Page 79 -** The second paragraph indicates that the July 22, 2010 version of NJDEP GWQS were used. Please indicate if these are the values in effect when the RIR is released. For example, it appears that the interim criteria for 1,4-dioxane is not the most current value.

61. **Section 4.6.1.1,page 79, last line on page** – Change interim specific GWQS of 1,4-dioxane to 0.4 ppb.

62. **Section 4.6.1.1, page 80, top paragraph** – Remove SVOC/pesticide discussion – this paragraph and the next are about VOC.

63. **Section 4.6.1.1, page 80** - The last paragraph cites published data for metals in groundwater to state that metals in groundwater at the Site warrant no further inquiry because site concentrations are similar to background. Text specifically cites aluminum, arsenic, iron and manganese but no published reference is provided for aluminum. Maximum iron and manganese concentrations at the site (Appendix I) are much higher than the cited background ranges. These factors as presented do not seem to support that no further inquiry into metals in groundwater is necessary.

64. **Section 4.6.1.1, page 81, paragraphs 2-5** – These paragraphs discuss TICs in groundwater; no discussion of estimated concentrations, whether they exceeded generic groundwater criteria (carcinogenic/noncarcinogenic) or why further study is or isn't warranted. This discussion should be added to the report.

65. **Section 4.6.1.2, page 81 at bottom of page** - Figure 2-6 should shows locations of all temporary and permanent wells; should probably also show pore water location PW-01 rather than solely discussing it in the text.

66. **Section 4.6.1.2, page 82, 4th paragraph** - This states that benzene concentrations at MW-10 and MW-19 are marginally above the standard. Standard is 1 ppb. Concentrations are 2 to 3.2 ppb – state the concentrations and remove the qualifying word "marginal".

67. **Section 4.6.2.2, page 83, third, fourth, fifth, sixth, seventh bullets** - Table 4B-A does not highlight these SVOC exceedances; for TWP-6 benz(a)pyrene equals, does not exceed standard.

68. **Section 4.6.1.2, page 84, top paragraph** – In some cases filtered metals concentrations are similar to unfiltered concentrations. Arsenic, iron, manganese and sodium in MW-3 for example. Not all cases of metals exceedances seems to be related to colloids – especially iron and manganese. List of metals exceedances leaves out some that exceed in temporary well points, e.g. chromium, cobalt, copper (and cyanide). The idea that metals concentrations are due to colloids is not necessarily supported, this paragraph should be revised accordingly.

69. **Section 4.6.1.2, page 84, second paragraph** – States that X-3 data, in the wetlands, indicates that iron in groundwater is less soluble in the wetlands, as the report discusses. It is the only location where a well is that far into the wetlands. Rather than "indicates", state that this "suggests" since this idea cannot be tested elsewhere.

70. **Section 4.6.1.2, page 84, third paragraph** - This discusses regionally high concentrations of metals due to rock type – see specific comment 63 above.

71. **Section 4.6.1.2, page 84, paragraph 4** - This discusses TICs in groundwater, stating that their presence is not confirmed because they were detected in only one of two sampling events in 2015 and concentrations were low. However they were detected in the previous phase. In addition, TIC concentrations are estimated, results from a calibrated analysis could be very different than TIC concentrations. TICs should be evaluated further to see if they warrant

calibrated analysis. This also applies to TIC mephenesin, found GW-TWP-8, and in a waste sample from TP-09.

72. **Section 4.6.3, page 85, bullet list** – Benzene exceedance at MW-10 is not discussed. PCB exceedance at TWP-4 not discussed. SVOC and pesticide exceedances not discussed. Please revise to include all exceedences.

73. **Section 4.6.3, page 86, First paragraph** – As noted above, dismissal of metals in groundwater as being due to ambient conditions and/or colloids is not well supported and should be reviewed and revised.

74. **Section 4.8, page 87, second paragraph** – Figure 4-3 shows exceedances of NJDEP criteria but not of USEPA criteria. Consider adding a second figure as showing both criterias' exceedances is too much for one figure.

75. **Section 4.8 Surface Water, page 87** - There are a number of instances where the semi-quantitative analysis indicated that specific contaminants were elevated compared to background, but the results were not discussed in the text. The text should be revised to explain why these results were not included, for instance, is it because the concentrations of these contaminants were below ARAR's?

76. **Section 4.8.1.1.2, page 89, first sentence**- Identify which 5 samples are the downstream Loantake Brooke samples. It's difficult to follow the figure/text without that.

77. **Section 4.8.1.2.2, page 90, first sentence of section** – Identify the 10 downstream samples for Black Brook.

78. **Section 4.8.1.2, page 92, first paragraph** – Based on upstream data, the concentrations of barium, cadmium, copper nickel and zinc found downstream in Black Brook may indicate landfill impact; however, report suggests otherwise for these contaminants based on their statistical analysis (see review statistical analysis).

79. **Section 4.8.1.3, page 92, second paragraph** – This states that benzene, TCE and VC were found in ponds at similar concentrations collected in the brooks upstream of the site; the Figure 4-3 shows no exceedances of these compounds upstream of the site. These VOCs are not listed in the upstream summary for the brooks in Attachment I. Seems contradictory; see review of statistical analysis.

80. **Section 4.8.1.3, page 92, third paragraph** – This states bis(2-ethylhexyl)phthalate concentration in ponds is similar to upstream of landfill, but there are exceedances in pond, none shown upstream on Figure 4-3. This compound is not listed in the upstream summary for the brooks in Attachment 1. See review of statistical analysis.

81. **Section 4.8.1.3, page 92, last paragraph** – This states that dissolved Mn appears elevated relative to upstream conditions. Based on Appendix I, total and dissolved Mn appear similar to each other, and to upstream conditions.

82. **Section 4.8.2, page 94, top paragraph** – SW-SW-44 (not SW-44) is located near the northwestern edge of the landfill (not the northeastern, as stated).

83. **Section 4.8.3, page 94, last paragraph** – This paragraph omits VOC exceedances in ponds. Please revise.

84. **Section 4.8.3, page 95, top paragraph** - As stated above in comment 82, manganese concentrations in ponds may not suggest landfill impact based on Appendix I.

85. **Section 4.9, page 95, third paragraph of section** – the reference for BTVs should be Table B-7D, not B-7C.

86. **Section 4.9.1.2.2, page 99, fourth paragraph** – States that PCB detection limit in upstream Black Brook samples was higher than PCB detections in downstream Black Brook samples. Therefore concentrations in upstream Black Brook may be higher than the down stream J values. To properly address this hypothesis, the report should present the upstream MDLs.

87. **Section 4.9.1.3, page 101, last paragraph** – What is the evidence/documentation of skeet shooting over the ponds as opposed to the shooting range?

88. **Section 4.9.2, page 103, top of page** – This states that POI-14 was car battery casings. The fact that lead at SS-169 and SS-170 was at lower concentration than at SS-144 does not preclude that this area was impacted by the landfill. More data would be necessary to rule out the landfill as a source of lead at SS-169, SS-170, SS-171, and/or confirm off-site shooting range as source.

89. **Section 6.1 Summary of Hydrogeologic Conditions, page 122** - This section should specifically discuss the discharge point for the shallow water-bearing unit. It is only discussed in general terms in the third paragraph. The section also devotes a full paragraph to discussing the underlying clay aquitard but relatively little discussion of the shallow water bearing unit is provided. The conceptual model should expand the discussion of this unit because it is the primary pathway for contaminant migration in groundwater. The wide range of hydraulic conductivity estimates should be discussed in terms of formation material and continuity of more conductive sand beds. The discussion of saturated waste material should also indicate if the difference in depth to groundwater is a function of ground surface elevation or other waste characteristics and whether mounding of groundwater, typical of landfill, has resulted in a radial groundwater flow pattern. This is a key factor when evaluating the impact of "upgradient" contamination on the Site, as discussed in section 6.2.2.2.

90. **Section 6.2.1 Constituent Sources, page 123** - This section indicates that there are limited point sources in the landfill but that they are a minor component of the total waste volume. The section should also discuss if these points sources, although small in volume, may be a major source of environmental contamination, particularly to groundwater, compared the larger volumes of standard municipal waste.

91. **Section 6.2.2.2 Groundwater in the Shallow Water-Bearing Zone, page 124** - The "potential sources upgradient" should be specifically discussed.

92. **Section 6.2.2.3 Fate and Transport of Constituents, page 128** - The text indicates that geochemical conditions can be either aerobic or anaerobic and what the fate of constituents like benzene could be. At this point the conceptual model should indicate what the conclusions are from the data collected to date. DO and ORP measurements from groundwater samples should give an idea of these conditions and a more definite statement should be made concerning the benzene concentrations at MW-3. This should also be the case in the last paragraph on page 129 where redox controlled metals area discussed.

93. **Section 6.3 Overview of the Landfill, Constituent Transport Processes, and Constituent Distribution, page 131** - As discussed on specific comment 90, although industrial waste volumes may be small compared to the overall municipal waste volume, the conceptual model should indicate if they are the major source of environmental contamination, particularly to groundwater.

94. **Section 6.4 Identification of Data Gaps and Uncertainty, page 133** - Additional justification should be provided for the offsite shooting range as a potential source of lead when the shooting range to the north of the landfill does not appear to be.

95. **Section 7.0 Summary and Conclusions, Fifth Bullet, page 134** - More detail should be provided with regard to the Site impact on the "soil beneath" the landfill. It is not clear what type of soil this refers to. Where there is groundwater contamination, the fate and transport section indicates that contaminants should be adsorbing to soil.